ber of double stars of the class which Sir William Herschel has pointed out as tests of a good $3\frac{1}{2}$-inch refractor. Encouraged by his success, he again attempted a 6-inch object-glass, with a different manner of adjusting and securing the lenses, and considers the result of his endeavour as proving at least the practicability of the construction. This instrument, with a power of 143, shows the small star in Polaris so distinct and brilliant, that its transit might be taken with the utmost certainty; it exhibits distinctly the small stars in α Lyræ, Aldebaran, Rigel, &c. and decidedly separates Castor, γ Leonis, and ϵ Bootis. The belts and double ring of Saturn are well exhibited with a power of 150; and the belts and satellites of Jupiter are tolerably defined with the same power, but will not bear a higher power than about 200.

In the usual construction of achromatic telescopes, the two or the three lenses composing the object-glass are brought into immediate contact. But the high dispersive power of the sulphuret of carbon enables Mr. Barlow to place the fluid correcting lens at a distance from the plate object lens equal to half its focal length. By this means the fluid lens, which is the most difficult part of the construction, is reduced to one half or less of the size of the plate lens. This construction, therefore, renders us independent of flint glass, enables us to increase the aperture of the telescope to a considerable extent; and gives us all the light, field, and focal power of a telescope of one and a half time the length of the tube. The author investigates analytically the formulæ for calculating the proper distance of the lenses on this construction, and expresses a hope that further experiments will enable us to determine the precise distance which shall reduce what has been termed the secondary spectrum, inseparable from the ordinary construction, either to zero, or to an inconsiderable amount.

A Catalogue of Nebulæ and clusters of Stars in the Southern Hemisphere, observed at Paramatta in New South Wales, by James Dunlop, *Esq. In a Letter addressed to Sir* Thomas Makdougall Brisbane, *Bart. K.C.B. late Governor of New South Wales. Presented to the Royal Society by* John Frederick William Herschel, *Esq. Vice President.* Read December 20, 1827. [*Phil. Trans.* 1828, *p.* 113.]

The observations, of which the results are here given, were made by Mr. Dunlop in the open air, with a 9-feet reflecting telescope, having the clear aperture of the large mirror 9 inches, and fitted up as a meridian telescope; the position of which, and the index error, being ascertained by the passage of known stars. The drawings which accompany the paper were made at the time of observation of the appearances of a great number of nebulæ and clusters, and particularly of the nebulæ major and minor. The paper contains a catalogue and description of 629 nebulæ, arranged in the order of their south polar distance, and in zones for each degree in the order of their right ascension. A few observations are subjoined, describing more particularly the appearance of the nebula minor, which,

seen through the telescope, resembles one of the brighter portions of the milky way; of the nebula major, which is brighter, more irregular, and composed of a great number of different parts; and of the dark space on the east side of the cross, or the black cloud, as it is called, which is occasioned by the almost total absence of stars. It is remarked by the author, that neither of the two nebulæ, major and minor, are at present in the place assigned to them by La Caille. He finds also that scarcely any nebulæ exist in a high state of condensation, and very few even in a state of moderate condensation towards the centre. Some have bright points in or near the centre, many of wnich may be stars; but the greater number of the nebulæ appear only as condensations of the general nebulous matter into faint nebulæ of various forms and magnitudes, generally not well defined; while many of the larger nebulous appearances are resolvable into stars of small magnitudes. But whether nebulæ are universally thus resolvable, is a question of which our instruments are yet incompetent to afford a direct solution, and in the discussion of which we have only analogy as our guide.

An Account of Trigonometrical Operations in the Years 1821, 1822, *and* 1823, *for determining the Difference of Longitude between the Royal Observatories of Paris and Greenwich. By Captain* Henry Kater, *V.P.R.S.* Read January 31, and February 7, 1828. [*Phil. Trans.* 1828, *p.* 153.]

The first section of this paper contains a narrative of the proceedings of the Commission appointed for executing the object announced in the title.

The first trigonometrical operations for connecting the meridians of Paris and Greenwich were carried on by General Roy, in cooperation with Messrs. de Cassini, Mechain, and Legendre, in the year 1790, an account of which was published in the Philosophical Transactions of that year. In 1821, the Royal Academy of Sciences, and Board of Longitude at Paris, communicated to the Royal Society of London their desire that these operations should be repeated, and the following Commissioners were nominated by these scientific bodies for that purpose; namely, Messrs. Arago and Mathieu, on the part of the Academy of Sciences; and Lieutenant-Colonel Colby and Captain Kater, on the part of the Royal Society.

The instrument employed in these operations was the great theodolite of Ramsden, belonging to the Royal Society, and the same which had formerly been used by General Roy.

It was at first proposed to adopt as a base, some one of the distances given by the trigonometrical survey of Great Britain, and to connect it with General Roy's stations; but it was found that the guns and wooden pipes, which had marked these stations, had been either removed or lost, so that the exact stations could not be immediately ascertained. The signals used for connecting the stations upon the coasts of England and France were lamps with compound lenses,